Harshal Marathe

2023-08-12

rm=list(ls)  
#install.packages("dyplr")  
library("dplyr")

## Warning: package 'dplyr' was built under R version 4.2.3

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

#or  
#install.packages("tydiverse")  
#library("dplyr")  
#data.frame  
Manager <- c(1:5)  
date <- c("10/24/08","10/28/08","10/01/08","10/12/08","05/01/09")  
Country <- c("US","US","UK","UK","UK")  
Gender <- c("M","F","F","M","F")  
Age <- c(32,45,25,39,99)  
q1 <- c(5,3,3,3,2)  
q2 <- c(4,5,5,3,2)  
q3 <- c(5,2,5,4,1)  
q4 <- c(5,5,5,NA,2)  
q5 <- c(5,5,2,NA,1)  
#a)  
Employee <- data.frame(Manager,date,Country,Gender,Age,q1,q2,q3,q4,q5)  
Employee

## Manager date Country Gender Age q1 q2 q3 q4 q5  
## 1 1 10/24/08 US M 32 5 4 5 5 5  
## 2 2 10/28/08 US F 45 3 5 2 5 5  
## 3 3 10/01/08 UK F 25 3 5 5 5 2  
## 4 4 10/12/08 UK M 39 3 3 4 NA NA  
## 5 5 05/01/09 UK F 99 2 2 1 2 1

#b)  
new\_data <- mutate(Employee,total\_score=q1+q2+q3+q4+q5,mean\_score=(q1+q2+q3+q4+q5)/5)  
new\_data

## Manager date Country Gender Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0  
## 4 4 10/12/08 UK M 39 3 3 4 NA NA NA NA  
## 5 5 05/01/09 UK F 99 2 2 1 2 1 8 1.6

head(new\_data,n=3)

## Manager date Country Gender Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0

#c)  
recoded\_gender <- recode(new\_data$Gender,"M"="Male","F"="Female")  
recoded\_gender

## [1] "Male" "Female" "Female" "Male" "Female"

#using pipe operator  
#new\_gender <- new\_data$gender%>%recode("M"="Male","F"="Female")  
#new\_gender  
  
#d)  
new\_data <- rename(new\_data,ID="Manager",Sex="Gender")  
print(new\_data)

## ID date Country Sex Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0  
## 4 4 10/12/08 UK M 39 3 3 4 NA NA NA NA  
## 5 5 05/01/09 UK F 99 2 2 1 2 1 8 1.6

#e)  
new\_data%>%arrange(Sex,total\_score)

## ID date Country Sex Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 5 05/01/09 UK F 99 2 2 1 2 1 8 1.6  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0  
## 4 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 5 4 10/12/08 UK M 39 3 3 4 NA NA NA NA

new\_data

## ID date Country Sex Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0  
## 4 4 10/12/08 UK M 39 3 3 4 NA NA NA NA  
## 5 5 05/01/09 UK F 99 2 2 1 2 1 8 1.6

#f)  
new\_data%>%dplyr::select(ID,mean\_score)

## ID mean\_score  
## 1 1 4.8  
## 2 2 4.0  
## 3 3 4.0  
## 4 4 NA  
## 5 5 1.6

print(new\_data)

## ID date Country Sex Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8  
## 2 2 10/28/08 US F 45 3 5 2 5 5 20 4.0  
## 3 3 10/01/08 UK F 25 3 5 5 5 2 20 4.0  
## 4 4 10/12/08 UK M 39 3 3 4 NA NA NA NA  
## 5 5 05/01/09 UK F 99 2 2 1 2 1 8 1.6

#g)  
new\_data%>%filter(Gender=="M" & total\_score>10)

## ID date Country Sex Age q1 q2 q3 q4 q5 total\_score mean\_score  
## 1 1 10/24/08 US M 32 5 4 5 5 5 24 4.8

##Q2

rm(list=ls())  
#install.packages("tidyverse")  
#install.packages("dplyr")  
library(dplyr)  
library(MASS)

##   
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':  
##   
## select

data("mtcars")  
View(mtcars)  
head(mtcars,n=10)

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

tail(mtcars)

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.7 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.9 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.5 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.5 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.6 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.6 1 1 4 2

#a)  
filtered\_hp <- mtcars%>%filter(hp>100)%>%arrange(desc(mpg))  
filtered\_hp

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

#b)  
#mtcars %>% select(mpg,hp,qsec)  
mtcars %>% dplyr::select(mpg,hp,qsec)

## mpg hp qsec  
## Mazda RX4 21.0 110 16.46  
## Mazda RX4 Wag 21.0 110 17.02  
## Datsun 710 22.8 93 18.61  
## Hornet 4 Drive 21.4 110 19.44  
## Hornet Sportabout 18.7 175 17.02  
## Valiant 18.1 105 20.22  
## Duster 360 14.3 245 15.84  
## Merc 240D 24.4 62 20.00  
## Merc 230 22.8 95 22.90  
## Merc 280 19.2 123 18.30  
## Merc 280C 17.8 123 18.90  
## Merc 450SE 16.4 180 17.40  
## Merc 450SL 17.3 180 17.60  
## Merc 450SLC 15.2 180 18.00  
## Cadillac Fleetwood 10.4 205 17.98  
## Lincoln Continental 10.4 215 17.82  
## Chrysler Imperial 14.7 230 17.42  
## Fiat 128 32.4 66 19.47  
## Honda Civic 30.4 52 18.52  
## Toyota Corolla 33.9 65 19.90  
## Toyota Corona 21.5 97 20.01  
## Dodge Challenger 15.5 150 16.87  
## AMC Javelin 15.2 150 17.30  
## Camaro Z28 13.3 245 15.41  
## Pontiac Firebird 19.2 175 17.05  
## Fiat X1-9 27.3 66 18.90  
## Porsche 914-2 26.0 91 16.70  
## Lotus Europa 30.4 113 16.90  
## Ford Pantera L 15.8 264 14.50  
## Ferrari Dino 19.7 175 15.50  
## Maserati Bora 15.0 335 14.60  
## Volvo 142E 21.4 109 18.60

#c)  
DPC\_1 <- mtcars%>%mutate(DPC=disp/cyl)  
DPC\_1

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1  
## Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2  
## DPC  
## Mazda RX4 26.66667  
## Mazda RX4 Wag 26.66667  
## Datsun 710 27.00000  
## Hornet 4 Drive 43.00000  
## Hornet Sportabout 45.00000  
## Valiant 37.50000  
## Duster 360 45.00000  
## Merc 240D 36.67500  
## Merc 230 35.20000  
## Merc 280 27.93333  
## Merc 280C 27.93333  
## Merc 450SE 34.47500  
## Merc 450SL 34.47500  
## Merc 450SLC 34.47500  
## Cadillac Fleetwood 59.00000  
## Lincoln Continental 57.50000  
## Chrysler Imperial 55.00000  
## Fiat 128 19.67500  
## Honda Civic 18.92500  
## Toyota Corolla 17.77500  
## Toyota Corona 30.02500  
## Dodge Challenger 39.75000  
## AMC Javelin 38.00000  
## Camaro Z28 43.75000  
## Pontiac Firebird 50.00000  
## Fiat X1-9 19.75000  
## Porsche 914-2 30.07500  
## Lotus Europa 23.77500  
## Ford Pantera L 43.87500  
## Ferrari Dino 24.16667  
## Maserati Bora 37.62500  
## Volvo 142E 30.25000

#d)  
mgp\_group <- mtcars%>%group\_by(mpg)%>%summarize(mean\_mpg=mean(mpg),sd\_mpg=sd(mpg))  
mgp\_group

## # A tibble: 25 × 3  
## mpg mean\_mpg sd\_mpg  
## <dbl> <dbl> <dbl>  
## 1 10.4 10.4 0  
## 2 13.3 13.3 NA  
## 3 14.3 14.3 NA  
## 4 14.7 14.7 NA  
## 5 15 15 NA  
## 6 15.2 15.2 0  
## 7 15.5 15.5 NA  
## 8 15.8 15.8 NA  
## 9 16.4 16.4 NA  
## 10 17.3 17.3 NA  
## # ℹ 15 more rows

#e)  
cyl\_group <- mtcars%>%group\_by(cyl) %>% summarize(mean\_mpg=mean(mpg),mean\_hp=mean(hp))  
cyl\_group

## # A tibble: 3 × 3  
## cyl mean\_mpg mean\_hp  
## <dbl> <dbl> <dbl>  
## 1 4 26.7 82.6  
## 2 6 19.7 122.   
## 3 8 15.1 209.

#f)  
mpg\_filter <- mtcars %>% filter(mpg>20) %>% arrange(desc(hp)) %>% dplyr::select(mpg,hp,qsec)  
mpg\_filter

## mpg hp qsec  
## Lotus Europa 30.4 113 16.90  
## Mazda RX4 21.0 110 16.46  
## Mazda RX4 Wag 21.0 110 17.02  
## Hornet 4 Drive 21.4 110 19.44  
## Volvo 142E 21.4 109 18.60  
## Toyota Corona 21.5 97 20.01  
## Merc 230 22.8 95 22.90  
## Datsun 710 22.8 93 18.61  
## Porsche 914-2 26.0 91 16.70  
## Fiat 128 32.4 66 19.47  
## Fiat X1-9 27.3 66 18.90  
## Toyota Corolla 33.9 65 19.90  
## Merc 240D 24.4 62 20.00  
## Honda Civic 30.4 52 18.52

#g)  
mpg\_cat <- mtcars %>% mutate(mpg\_category=ifelse(mpg>25,"High","low"))  
mpg\_cat

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1  
## Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2  
## mpg\_category  
## Mazda RX4 low  
## Mazda RX4 Wag low  
## Datsun 710 low  
## Hornet 4 Drive low  
## Hornet Sportabout low  
## Valiant low  
## Duster 360 low  
## Merc 240D low  
## Merc 230 low  
## Merc 280 low  
## Merc 280C low  
## Merc 450SE low  
## Merc 450SL low  
## Merc 450SLC low  
## Cadillac Fleetwood low  
## Lincoln Continental low  
## Chrysler Imperial low  
## Fiat 128 High  
## Honda Civic High  
## Toyota Corolla High  
## Toyota Corona low  
## Dodge Challenger low  
## AMC Javelin low  
## Camaro Z28 low  
## Pontiac Firebird low  
## Fiat X1-9 High  
## Porsche 914-2 High  
## Lotus Europa High  
## Ford Pantera L low  
## Ferrari Dino low  
## Maserati Bora low  
## Volvo 142E low

# %>% group\_by(mpg\_category) %>% summarize(mean(mpg))  
#h)  
scl\_1=mtcars %>% mutate(scale\_mpg=scale(mpg))  
scl\_1

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1  
## Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2  
## scale\_mpg  
## Mazda RX4 0.15088482  
## Mazda RX4 Wag 0.15088482  
## Datsun 710 0.44954345  
## Hornet 4 Drive 0.21725341  
## Hornet Sportabout -0.23073453  
## Valiant -0.33028740  
## Duster 360 -0.96078893  
## Merc 240D 0.71501778  
## Merc 230 0.44954345  
## Merc 280 -0.14777380  
## Merc 280C -0.38006384  
## Merc 450SE -0.61235388  
## Merc 450SL -0.46302456  
## Merc 450SLC -0.81145962  
## Cadillac Fleetwood -1.60788262  
## Lincoln Continental -1.60788262  
## Chrysler Imperial -0.89442035  
## Fiat 128 2.04238943  
## Honda Civic 1.71054652  
## Toyota Corolla 2.29127162  
## Toyota Corona 0.23384555  
## Dodge Challenger -0.76168319  
## AMC Javelin -0.81145962  
## Camaro Z28 -1.12671039  
## Pontiac Firebird -0.14777380  
## Fiat X1-9 1.19619000  
## Porsche 914-2 0.98049211  
## Lotus Europa 1.71054652  
## Ford Pantera L -0.71190675  
## Ferrari Dino -0.06481307  
## Maserati Bora -0.84464392  
## Volvo 142E 0.21725341

#i)  
ren <- mtcars %>% rename(MilesperGallon="mpg",Horsepower="hp",QuaterMileTime="qsec")  
ren

## MilesperGallon cyl disp Horsepower drat wt  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875  
## Datsun 710 22.8 4 108.0 93 3.85 2.320  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440  
## Valiant 18.1 6 225.0 105 2.76 3.460  
## Duster 360 14.3 8 360.0 245 3.21 3.570  
## Merc 240D 24.4 4 146.7 62 3.69 3.190  
## Merc 230 22.8 4 140.8 95 3.92 3.150  
## Merc 280 19.2 6 167.6 123 3.92 3.440  
## Merc 280C 17.8 6 167.6 123 3.92 3.440  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345  
## Fiat 128 32.4 4 78.7 66 4.08 2.200  
## Honda Civic 30.4 4 75.7 52 4.93 1.615  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780  
## QuaterMileTime vs am gear carb  
## Mazda RX4 16.46 0 1 4 4  
## Mazda RX4 Wag 17.02 0 1 4 4  
## Datsun 710 18.61 1 1 4 1  
## Hornet 4 Drive 19.44 1 0 3 1  
## Hornet Sportabout 17.02 0 0 3 2  
## Valiant 20.22 1 0 3 1  
## Duster 360 15.84 0 0 3 4  
## Merc 240D 20.00 1 0 4 2  
## Merc 230 22.90 1 0 4 2  
## Merc 280 18.30 1 0 4 4  
## Merc 280C 18.90 1 0 4 4  
## Merc 450SE 17.40 0 0 3 3  
## Merc 450SL 17.60 0 0 3 3  
## Merc 450SLC 18.00 0 0 3 3  
## Cadillac Fleetwood 17.98 0 0 3 4  
## Lincoln Continental 17.82 0 0 3 4  
## Chrysler Imperial 17.42 0 0 3 4  
## Fiat 128 19.47 1 1 4 1  
## Honda Civic 18.52 1 1 4 2  
## Toyota Corolla 19.90 1 1 4 1  
## Toyota Corona 20.01 1 0 3 1  
## Dodge Challenger 16.87 0 0 3 2  
## AMC Javelin 17.30 0 0 3 2  
## Camaro Z28 15.41 0 0 3 4  
## Pontiac Firebird 17.05 0 0 3 2  
## Fiat X1-9 18.90 1 1 4 1  
## Porsche 914-2 16.70 0 1 5 2  
## Lotus Europa 16.90 1 1 5 2  
## Ford Pantera L 14.50 0 1 5 4  
## Ferrari Dino 15.50 0 1 5 6  
## Maserati Bora 14.60 0 1 5 8  
## Volvo 142E 18.60 1 1 4 2

#j)  
recoded\_am <- recode(mtcars$am,"0"="Automatic","1"="Mannual")  
recoded\_am

## [1] "Mannual" "Mannual" "Mannual" "Automatic" "Automatic" "Automatic"  
## [7] "Automatic" "Automatic" "Automatic" "Automatic" "Automatic" "Automatic"  
## [13] "Automatic" "Automatic" "Automatic" "Automatic" "Automatic" "Mannual"   
## [19] "Mannual" "Mannual" "Automatic" "Automatic" "Automatic" "Automatic"  
## [25] "Automatic" "Mannual" "Mannual" "Mannual" "Mannual" "Mannual"   
## [31] "Mannual" "Mannual"

mtcars %>% mutate(Trans=recode(am,'0'="Automatic",'1'="Mannual"))

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
## Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
## Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
## Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
## Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4  
## Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4  
## Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3  
## Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3  
## Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3  
## Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4  
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4  
## Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4  
## Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1  
## Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2  
## Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1  
## Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1  
## Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2  
## AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2  
## Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4  
## Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2  
## Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1  
## Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2  
## Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2  
## Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4  
## Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6  
## Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8  
## Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2  
## Trans  
## Mazda RX4 Mannual  
## Mazda RX4 Wag Mannual  
## Datsun 710 Mannual  
## Hornet 4 Drive Automatic  
## Hornet Sportabout Automatic  
## Valiant Automatic  
## Duster 360 Automatic  
## Merc 240D Automatic  
## Merc 230 Automatic  
## Merc 280 Automatic  
## Merc 280C Automatic  
## Merc 450SE Automatic  
## Merc 450SL Automatic  
## Merc 450SLC Automatic  
## Cadillac Fleetwood Automatic  
## Lincoln Continental Automatic  
## Chrysler Imperial Automatic  
## Fiat 128 Mannual  
## Honda Civic Mannual  
## Toyota Corolla Mannual  
## Toyota Corona Automatic  
## Dodge Challenger Automatic  
## AMC Javelin Automatic  
## Camaro Z28 Automatic  
## Pontiac Firebird Automatic  
## Fiat X1-9 Mannual  
## Porsche 914-2 Mannual  
## Lotus Europa Mannual  
## Ford Pantera L Mannual  
## Ferrari Dino Mannual  
## Maserati Bora Mannual  
## Volvo 142E Mannual